TRENCHLESS TECHNOLOGY CENTER

Trenchless Technology: Trends & Opportunities

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Presentation Overview

1. Trenchless Installation Options for Water, Sewer, Gas, & Power
2. Trenchless Technology Trends
3. Trenchless Technology Opportunities

Trenchless Installation Options

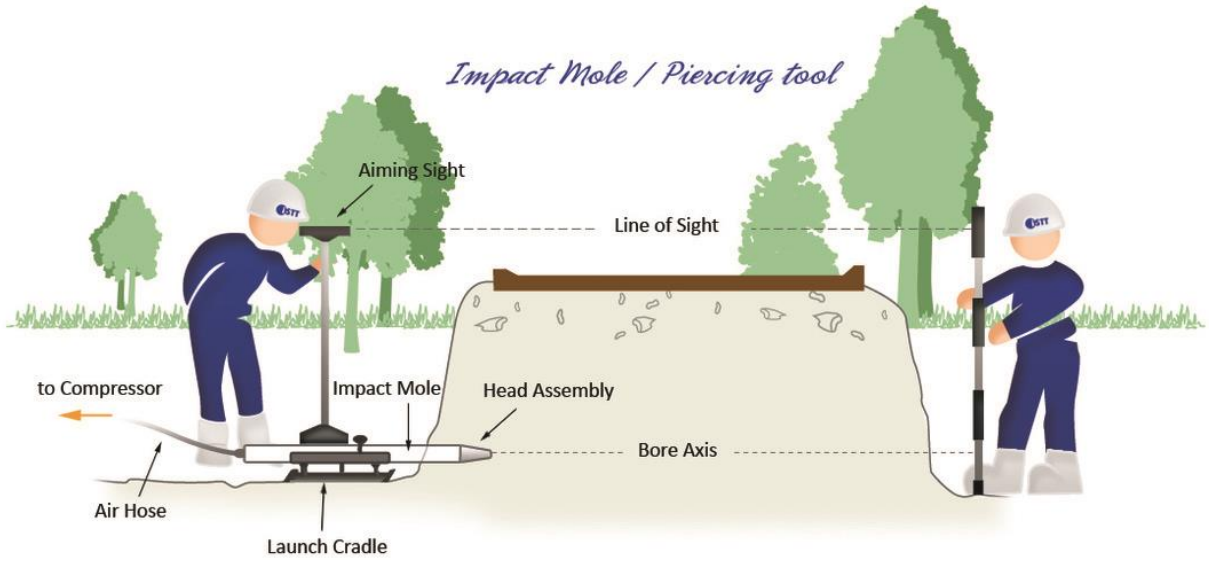
1. Pipe Ramming
2. Impact Moling
3. Pipe Jacking
4. Auger Boring
5. Microtunneling & Tunneling
6. Horizontal Direction Drilling (HDD)
7. Direct Steerable Pipe Thrusting (DSPT)

Pipe Ramming

1. Method does not remove soil until casing is fully installed
2. Minimizes voids under roads and railways
3. Preferred for adverse soil conditions
4. Rams are available to install casings as small as 4-in in diameter to over 180-inches
5. Accuracy is limited to starting line and grade typically
6. Water & Sewer

Impact Moling

1. Small diameter installation methods that uses pneumatic hammers as well
2. Some version have steerable capabilities, but accuracy is limited
3. Diameters are limited to 10 inches and smaller
4. Pipe or conduit is pulled into place behind moling head
5. Service Liners & Small Conduits



Pipe Jacking

1. Developed in early 1900s
2. Typically for pipe sizes 42-in and larger
3. Only applicable above the water table
4. Various excavation options used at the face
5. Common jacking pipes include RCP, Clay, Steel Casing, CCFRPM
6. Combines excavation and pipe installation into one step rather the traditional two-step process
7. Water & Sewer

Auger Boring

1. Little steering is possible
2. Minimal radial overcut
3. Only applicable above the water table
4. Typical installations are 400 ft or less
5. Accuracy can be improved with addition of guided boring equipment
6. Diameters range from small (~12-in) to over 6 ft in some cases
7. Water & Sewer

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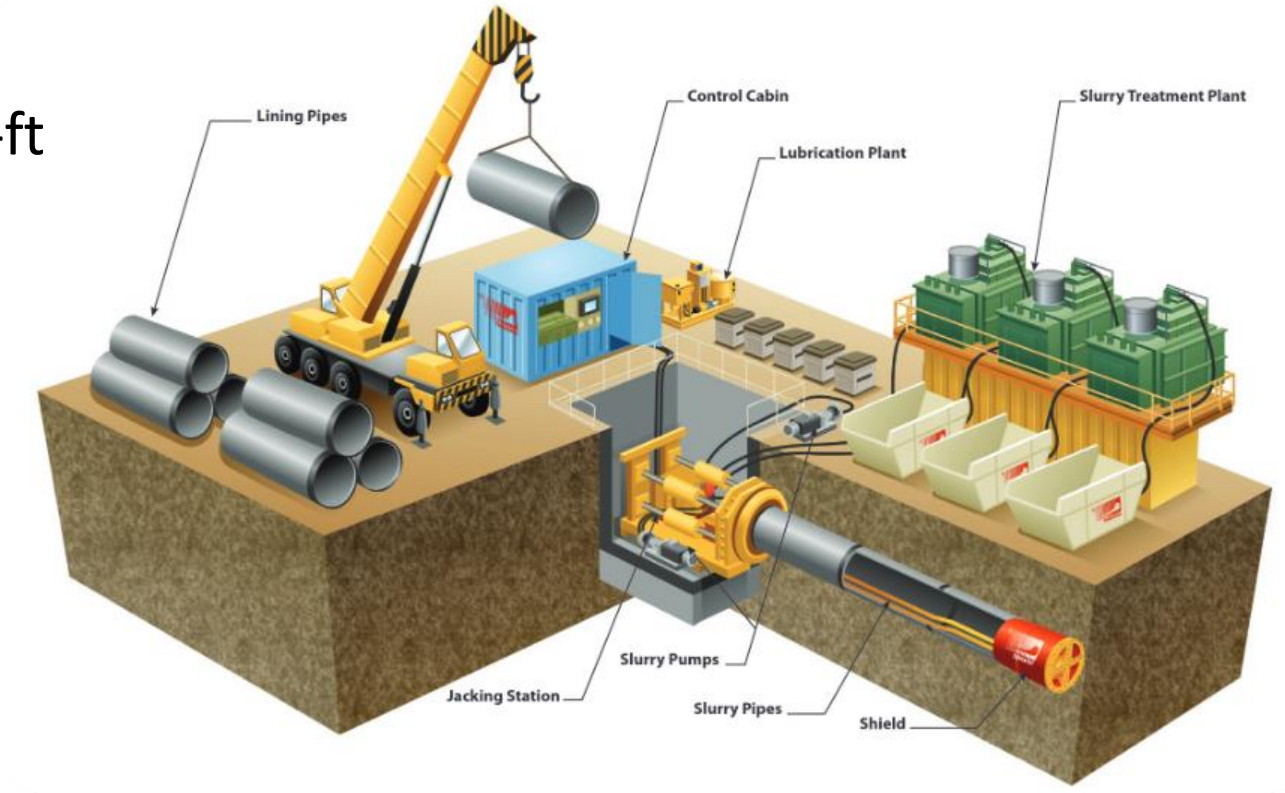
Microtunneling & Tunneling

1. Developed in 1970s internationally
2. Typically for pipe sizes 10-in up to 10-ft
   a. Tunneling above 10-12 ft in diameter
3. Applicable under the water table
4. Slurry used to stabilize the hole and cutting face
5. Laser guidance system for on-grade installations (highest accuracy)
6. Water & Sewer



Horizontal Directional Drilling (HDD)

1. A typical installation is a 3-step process
   a. Drilling the pilot hole
   b. Enlarging the pilot hole (reaming)
   c. Pulling in the pipeline
2. Can install small conduits all the way up to large diameters pipelines
3. Commonly used for road and water crossings and other smaller diameter trenchless installations
4. Power/Telecom, Water, & Gas

Direct Steerable Pipe Thrusting (DSPT)

1. Modified version of HDD that combines it with the benefits of microtunneling
2. Currently only available from one manufacturer
3. Lengths up to 1,500 m in a single install
4. Water & Gas

Trenchless Technology Trends

1. Improved/Hybrid methods are allowing for longer & more accurate installations than ever before
2. Even still trenchless may not always be the best option…trenching, micro-trenching, & open cut methods still have a place in the market
3. Major tech companies have been investing in the improvement of installation technologies, i.e. Facebook, Google, Boring Co., etc.

Trenchless Technology Opportunities

1. Improved safety through automation & remote operation of equipment
2. Improved safety through obstacle detection & damage avoidance (cross-bores)
3. Greater technology applicability through innovation/optimization

Great Sources of Information:

North American Society for Trenchless Technology (NASTT): www.nastt.org

International Society for Trenchless Technology (ISTT): www.istt.com

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Questions?

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